

Does perceived risk influence the effects of message framing?

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Does perceived risk influence the effects of message framing? Revisiting the link between prospect theory and message framing

Jonathan Van 't Riet^a, Anthony D. Cox^b, Dena Cox^b, Gregory D. Zimet^c, Gert-Jan De Bruijn^d, Bas Van den Putte^{d,e}, Hein De Vries^f, Marieke Q. Werrij^g and Robert A. C. Ruiter^h

^aBehavioural Science Institute, Radboud University Nijmegen, Nijmegen, The Netherlands; ^bKelley School of Business Indianapolis, Indiana University, Indianapolis, IN, USA; ^cSchool of Medicine, Indiana University, Indianapolis, IN, USA; ^dAmsterdam School of Communication Research (ASCOR), University of Amsterdam, Amsterdam, The Netherlands; ^eTrimbos Institute, Netherlands Institute for Mental Health and Addiction, Utrecht, The Netherlands; ^fSchool of Public Health and Primary Care (CAPHRI), Maastricht University, Maastricht, The Netherlands; ^gDepartment of Occupational Therapy, Zuyd University of Applied Sciences, Heerlen, The Netherlands; ^hDepartment of Work and Social Psychology, Maastricht University, Maastricht, The Netherlands

ABSTRACT

Health-promoting messages can be framed in terms of the beneficial consequences of healthy behaviour (gain-framed messages) or the detrimental consequences of unhealthy behaviour (loss-framed messages). An influential notion holds that the perceived risk associated with the recommended behaviour determines the relative persuasiveness of gain- and loss-framed messages. This 'risk-framing hypothesis', which was derived from prospect theory, has been central to health message-framing research for the better part of two decades and has enduring appeal to researchers and practitioners. It has found its way into several health communication handbooks and is communicated to the general public. The present article examines the validity of the risk-framing hypothesis anew by providing a review of the health message-framing literature. In spite of its ongoing appeal, we conclude that the hypothesis has severe theoretical flaws. In addition, we find that the empirical evidence in favour of the hypothesis is weak and inconsistent. It seems that, in applying prospect theory's tenets to a health-promotion context, some of the theory's key aspects have been lost in translation. At the close of the article, we offer a research agenda for the future, arguing that, above all, new methodology is needed to bring the message-framing literature further.

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Health-promoting messages can be framed in terms of the beneficial consequences of healthy behaviour (gain-framed) or the detrimental consequences of unhealthy behaviour (loss-framed). A large, and still growing, body of literature is dedicated to investigating which type of frame is more effective under which circumstances and why. Starting with Meyerowitz and Chaiken's (1987) first article on health message framing, the concept of risk has been central to this field. The single most influential explanation of message-framing effects has been the notion that the relative effectiveness of gain- versus loss-framed information is dependent on the risk that is associated

CONTACT Jonathan Van 't Riet  j.vantriet@maw.ru.nl

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with the advocated behaviour. In the present article, we argue that this explanation is theoretically flawed, and lacks empirical support.

The hypothesis that perceived risk influences the effects of message framing was inspired by the experiments that Kahneman and Tversky performed in their seminal prospect theory research. According to prospect theory (Kahneman & Tversky, 1984; Tversky & Kahneman, 1981), people respond differently to information about the consequences of a behavioural decision depending on whether the *same* consequences are presented as gains or losses. In a well-known study, Tversky and Kahneman (1981) asked participants to imagine the outbreak of a terrible 'Asian disease', which would kill 600 US citizens if left untreated. Next, they told participants that two medical programmes had been developed to counter the disease. In the gain-framed presentation, participants were told that Programme A would save 200 people, while Programme B had a one-third chance of saving all 600 people, and a two-third chance of saving no-one. In the loss-framed presentation, participants were told that Programme A would allow 400 people to die, whereas Programme B would result in a one-third chance that no-one would die and a two-third chance that all 600 people would die. Interestingly, most participants preferred the certain Programme A when the consequences were framed as gains, while the majority preferred the uncertain Programme B when the consequences were framed as losses, even though the expected utility in all four options is *exactly the same*. These findings seemed to suggest that people are risk-averse (i.e., avoiding uncertainty) when considering how to bring about gains, but risk-seeking (i.e., favouring uncertainty) when considering how to avoid losses.

This reasoning was first applied to the persuasion field by Meyerowitz and Chaiken (1987). Because Kahneman and Tversky's research showed that gain-framed information makes people risk-averse, Meyerowitz and Chaiken (1987) argued that gain-framed messages would be especially effective in promoting safe behaviours, like exercising, eating vegetables or indeed all behaviours that serve to prevent illness. On the other hand, because Kahneman and Tversky's research showed that loss-framed information makes people willing to take risks, Meyerowitz and Chaiken argued that loss-framed information would be more effective to promote risky behaviours. With 'risky' behaviour, they chiefly meant disease-detection behaviours, because these entail the possibility (i.e., risk) of finding out that one is ill. This line of reasoning, which we shall refer to as the 'risk-framing hypothesis', was adopted by Rothman, Salovey and colleagues (Rothman & Salovey, 1997; Rothman, Salovey, Antone, Keough, & Drake Martin, 1993) and has loomed large in message-framing research ever since.

In the present article, we argue that the risk-framing hypothesis is problematic. In the first section of the article, we re-examine the hypothesis' theoretical underpinnings, arguing that these are flawed. In the second section of the article, we assess the empirical evidence in favour of the risk-framing hypothesis and conclude that it is weak. We also note that proponents of the hypothesis more often than not have had to rely on additional hypotheses in order not to discard it. We conclude that alternative accounts of message-framing effects are necessary to provide a better explanation of the empirical findings.

Not all of our arguments are new. Some authors have criticised the notion that the risk associated with the advocated behaviour determines the relative effectiveness of gain- and loss-framed messages, both on empirical and on theoretical grounds (Cox, Cox, & Zimet, 2006; O'Keefe & Jensen, 2006). However, it should be noted that the momentum of the risk-framing hypothesis has not been slowed by those previous criticisms. Even though it is no longer the only account of message-framing effects available in the literature, it is still widely used to guide research (e.g., Shen & Mercer Kollar, 2015; Wansink & Pope, 2014). In addition, the risk-framing hypothesis has made its way into a number of handbooks for undergraduates (e.g., Holtzhausen & Zerfass, 2014; Suls & Wallston, 2008) and is also communicated to practitioners and to the public, most notably on the website of the American Psychological Association (APA): <http://www.apa.org/research/action/motivate.aspx>.

If we are right, and the risk-framing hypothesis is problematic, this means that academia wastes a lot of time investigating and writing about a hypothesis that should by now be discarded. More seriously, it means that young aspiring professionals and academics, those working in

prevention, and the public at large, are taught the wrong lessons from scientific research, and that public-health campaigns may not be based on sound science. For this reason, we set out to review the available evidence on the topic.

Perceived risk and message framing: a theoretical critique

As several authors have done before us (Cox et al., 2006; O'Keefe & Jensen, 2006), we argue that the tenets of the risk-framing hypothesis are flawed. Even if its predictions are partly supported by empirical evidence, the model simply does not deliver a satisfactory explanation of these findings. Central to our argument is the notion that, although Kahneman and Tversky's research can be said to have revealed something fundamental about human decision making, its results cannot be directly translated to a health-promotion context. We base this proposition on two arguments. First, we argue that prospect theory's conceptualisation of risk differs fundamentally from the way risk has been conceptualised in the risk-framing hypothesis and that it is unlikely that these different kinds of 'risk' will have similar effects. Second, we argue that the way Kahneman and Tversky presented their participants with information is significantly different from the way health-promotion messages are presented to participants in health message-framing studies.

Conceptualisation of risk

When considering the application of prospect theory's tenets to health message framing, a first problem is that the uncertainty that is so central to prospect theory is fundamentally different from the risk that is central to the risk-framing hypothesis. Kahneman and Tversky use the term 'risk' to mean variance of potential outcomes. Importantly, this variance consists of both upside and downside potential, referring to situations in which it cannot be known for certain which outcome, good or bad, all lives saved or no lives saved, will prevail (Cox et al., 2006). The risk-framing hypothesis, however, conceptualises risk as the possibility of something bad happening, suggesting that detection behaviours are risky because they entail the chance of finding out that one is ill. By omitting potential positive outcomes (upside risks) from this conceptualisation, it is unclear why people would ever be motivated to accept the risk in the first place (Cox et al., 2006).

The difference between risk as danger and risk as uncertainty may seem of little consequence to some readers. Indeed, Rothman and Salovey themselves have noted the difference, saying that 'the risk associated with a behavioural alternative usually cannot be defined in terms of the actual likelihood of a particular outcome' and that, in their reasoning, '[...] risky reflects the subjective perception that to perform a behaviour may involve an unpleasant outcome' (Rothman & Salovey, 1997, p. 5). However, they then continued their reasoning without ascribing much importance to this difference. But conceptualising risk in terms of perceived danger rather than in terms of uncertainty makes a world of difference. To illustrate this, let us investigate the claim that detection and prevention behaviours differ in 'perceived risk'.

Most likely, the reason that the risk-framing hypothesis has remained so popular with researchers is the fact that it offers such clear-cut recommendations: use gain-framed information with prevention behaviours and use loss-framed information with detection behaviours. But how plausible is it exactly that prevention and detection behaviours differ in perceived risk? If perceived risk is construed as 'the possibility of something bad happening', then indeed an argument can be made that people find detection behaviour 'risky'. If, however, we conceptualise risk as uncertainty, as prospect theory does, then the difference between detection and prevention behaviour is not so straightforward at all.

To be sure, there is a lot of uncertainty involved in detection behaviours. In the short term, no one can be sure whether self-examination or screening will result in finding potential symptoms. In the longer term, finding potential symptoms is no guarantee for effective treatment, and not finding any potential symptoms is no guarantee of living a long, healthy life.

But the question is not whether detection behaviour involves uncertainty; the question is whether engaging in detection behaviour can be construed as resulting in more uncertainty *relative to* not engaging in detection behaviour. Only then can detection behaviour be considered as the option with truly uncertain consequences in contrast to the certain consequences of the alternative option of not engaging in detection behaviour (O'Keefe & Jensen, 2007). There is no empirical evidence for this, and it hardly seems plausible. In fact, one might argue that engaging in detection behaviour is actually an attempt to *reduce* uncertainty regarding one's health status (Cox et al., 2006; Levin, Schneider, & Gaeth, 1998).

To a lesser extent, this reasoning applies to prevention behaviours: although people may engage in prevention behaviours to avoid disease, both engaging and not engaging in prevention behaviours can have a whole range of unforeseen and uncertain consequences. It thus seems that, in the attempt to derive the risk-framing hypothesis from prospect theory, 'key aspects of prospect theory [...] were lost in translation' (Cox et al., 2006, p. 89).

Risky choice framing versus goal framing

Perhaps the risk-framing hypothesis could be salvaged, even in light of our reasoning concerning perceived risk. After all, one could still argue that perceptions of uncertainty, rather than perceptions of danger, concerning recommended health behaviours influence the effects of message framing. However, there is an additional reason why the tenets of prospect theory are hard to apply to health message framing and that is the difference between the kind of framing that is used in Kahneman and Tversky's experiments compared to health message-framing studies.

To be sure, both in Kahneman and Tversky's experiments and in health message-framing research, participants are provided with information about the consequences of their decisions. However, Levin et al. (1998) have already noted that the kind of framing that is used in prospect theory experiments, which they have called 'risky choice framing', gives recipients all available information on two clearly delineated options, without trying to persuade them to choose one kind or another. In 'goal framing', the term Levin et al. use to describe the framing of persuasive messages, the consequences of only one behavioural alternative are mentioned and the information has the obvious goal of trying to persuade recipients to select one of the alternatives (i.e., compliance with the recommendations). O'Keefe and Jensen (2006) have also raised this point, referring to 'decision framing' and 'message framing', respectively.

The difference is substantial. In risky choice framing, participants are provided with a clear choice between two well-described and simple alternatives, one with a certain outcome and one with an uncertain outcome, and the way the information is framed turns out to influence participants' preferences with regards to the alternatives. In order to hypothesise that goal framing exerts a similar influence, one has to suppose that recipients of information about one option (performing the recommended behaviour in gain-framed information and not performing the recommended behaviour in loss-framed information) spontaneously consider the consequences of the behavioural alternative, engaging in a mental comparison of the two alternatives. But how likely is it that they will do this? Moreover, how likely is it that they will think about the consequences of both options in the same 'frame'? That is, how likely is it that they will think only of the positive consequences of both alternatives when they have been exposed to a gain frame, and think only of the negative consequences of both alternatives when they have been exposed to a loss frame?

Another crucial difference has also been overlooked in the literature, namely the fact that, in health message framing, a 'reference outcome' (Tversky & Kahneman, 1986, p. 258) is missing. In prospect theory, outcomes are expressed as positive or negative deviations (gains or losses) from a reference outcome (Tversky & Kahneman, 1986). Consider the gain-framed version of the Asian disease dilemma. This version casts the consequences of the decision in terms of lives saved, thereby evoking the implicit reference outcome of 'zero lives saved'. In light of this 'zero lives saved' reference point, the certain course of action ('200 lives saved') seems more attractive to the majority of

participants than the uncertain course of action. The loss-framed version, in contrast, casts the consequences of the decision in terms of lives lost, hence evoking the neutral reference outcome of 'zero lives lost'. In light of the 'zero lives lost' reference point, the certain course of action ('400 lives lost') now seems less attractive to the majority of participants than the uncertain course of action. Thus, participants in Tversky and Kahneman's experiment may have thought that they were comparing the certain course of action with the uncertain course of action, but what they actually were doing was comparing both options with the reference outcome. In health message framing, this reference outcome is wholly absent. Thus, even if we were to concede that recipients of framed health messages engage in a mental comparison of compliance and non-compliance, *there is no reference outcome to make prospect theory's framing effects plausible.*

In sum, in risky choice paradigms, participants are given a choice between two clearly delineated options, of which they are given all relevant information. Both options have positive as well as negative consequences, one option constituting a mediocre, but certain choice, and one option constituting a high-stakes gamble. In goal framing, the consequences of only one behavioural choice are communicated. It is unlikely that upon receiving this information participants would construe their situation as entailing a clear choice between two options, healthy and unhealthy behaviour. And even if they would, the absence of a reference outcome makes it unlikely that health message-framing effects could be directly predicted from prospect theory.

These problems with the risk-framing hypothesis cast doubt on its ability to foster our knowledge of message-framing effects or to advise practitioners on whether to use gain- or loss-framing in their messages. It would lead one to expect that the empirical evidence in favour of the model must be weak at best. Given the enormous influence of the risk-framing hypothesis on the message-framing literature, however, it is warranted to investigate its empirical support with equal rigour as its theoretical plausibility. We will do this in the next section.

Perceived risk and message framing: empirical evidence

It is noteworthy that the predictions of the risk-framing hypothesis together make up a model of *mediated moderation*, with perceived risk mediating the moderating influence of behavioural function. And it should not be difficult to test the entire model. That is, a group of participants could be exposed to either gain- or loss-framed information about either prevention- or detection behaviour, the perceived risk associated with the recommended behaviour could be assessed and relevant outcome measures could be included to assess persuasion. We know of only one study, however, that offered such a comprehensive test of the entire model. This study (Cox et al., 2006, Study 1) manipulated the function (prevention versus detection) of a health product, assessed the extent to which participants considered the product as risky, and combined the manipulation of behavioural function with a manipulation of message framing to investigate effects on persuasive outcome measures. The results, however, were not at all in line with the risk-framing hypothesis' predictions. Prevention and detection products did not differ in perceived risk, and the predicted interaction between function and framing failed to materialise. In fact, the results pointed in the opposite direction, with a (non-significant) gain-framed advantage in the high-risk condition and a (non-significant) loss-framed advantage in the low-risk condition (see also Van 't Riet et al., 2014, Study 1).

To our knowledge, Cox et al.'s (2006) study provides the only full test of the risk-framing hypothesis. In the absence of other comprehensive tests, it seems that we must piece together the empirical evidence on the model's separate predictions. We will do this in the next section, first reviewing studies in which, like in the study by Cox and colleagues, behavioural function was manipulated experimentally. Afterwards, we will review the meta-analytic evidence for the interaction between behavioural function and message framing. In a third section, we will investigate the empirical evidence for the moderating effect of perceived risk on message-framing effects.

Behavioural function and message framing: experimental evidence

Several studies have experimentally manipulated behavioural function to investigate its influence on the effects of message framing. Rothman, Martino, Bedell, Detweiler, and Salovey (1999) were the first to design an experiment in which the same behaviour was described to participants as either a prevention or a detection behaviour. The results of a first study revealed that there was no overall function by framing interaction effect, but the authors did find a three-way interaction among Need for Cognition (NFC; Cacioppo, Petty, & Kao, 1984), behavioural function and framing. For those participants with a high NFC, loss-framed information was more persuasive than gain-framed information in the detection condition, whereas no significant difference between gain- and loss-framed was found in the prevention condition. The results of a second experiment showed that gain-framed information was more persuasive than loss-framed information in the prevention condition, whereas loss-framed information was more persuasive than gain-framed information in the detection condition.

The results of Study 1 are somewhat problematic: an interaction with NFC is found, even though NFC does not play a significant role in prospect theory or in Meyerowitz and Chaiken's (1987) original reasoning. Study 2, on the other hand, seemed to yield unqualified and strong support for the risk-framing hypothesis. As shown above, however, Cox et al. (2006) attempted to replicate these results and failed to find an interaction between product function and framing. As such, it seems that only three studies employed a sufficiently strong design to be able to directly test message-framing effects for prevention versus detection behaviours. Between these three studies, the evidence for the function by framing interaction is inconsistent.

Behavioural function and message framing: meta-analytic evidence

In the absence of additional experimental evidence, we could turn our attention to the large number of message-framing studies that investigate the effects of message framing in the context of one behaviour. Although different health behaviours are very hard to compare, meta-analyses can go some way to rectifying this problem by synthesising the results for a large number of different prevention and detection behaviours (e.g., Peters, Ruiter, & Kok, 2013; Tannenbaum et al., 2015). As it turns out, the persuasive effects of gain- and loss-framed messages have been investigated in several meta-analyses (Gallagher & Updegraff, 2012; Levin et al., 1998; O'Keefe & Jensen, 2006, 2007, 2009). One of the meta-analytic studies (O'Keefe & Jensen, 2007) focused on prevention behaviours and found a significant but weak advantage of gain-framed messages over loss-framed messages ($r = .032$). A particularly strong effect was found for framed information that promoted dental hygiene behaviours, such as flossing ($r = .154$). In fact, the overall advantage of gain-framed information seemed entirely due to dental hygiene behaviours, as the analyses showed that no significant advantage of gain-framed information was found when dental hygiene behaviours were excluded from the analysis. A second meta-analysis investigated framing effects for detection behaviours and found a similar weak but significant effect in the hypothesised direction ($r = -.039$; O'Keefe & Jensen, 2009). However, as for prevention behaviours, the effect was entirely due to one specific behaviour, in this case breast cancer detection ($r = -.056$), and no evidence for differential effects of gain- and loss-framed messages was found when breast cancer detection was excluded.

These meta-analyses thus seem to yield only limited support for the risk-framing hypothesis. However, one limitation of these studies is that they did not distinguish between the different persuasive outcomes of message-framing studies (Gallagher & Updegraff, 2012; Latimer, Salovey, & Rothman, 2007). That is, they included studies that reported effects on attitudes, intentions and behaviour in the same analysis, yielding an overall effect size for 'persuasion'. Gallagher and Updegraff (2012) therefore set out to provide an updated meta-analysis of health message-framing research, running separate analyses for immediate cognitive responses, like attitudes and intentions, and behavioural responses. Following the risk-framing hypothesis, Gallagher and Updegraff

hypothesised that gain-framed messages would be most effective for prevention behaviour, whereas loss-framed messages would be most effective for detection behaviour.

The results of their meta-analysis showed that there were no differential effects of gain- and loss-framed messages for detection behaviours, neither on immediate cognitive nor on behavioural responses. For prevention behaviours, no effects were found for the immediate cognitive responses, but a significant advantage of gain-framed messages was found for behavioural responses ($r = .083$). Subsequent analyses showed that the effects on different prevention behaviours ranged from $r = -.015$ to $r = .237$, with significant effects for skin cancer prevention, smoking cessation and physical activity, and non-significant effects for dietary and obesity-related behaviours, oral health behaviours, safe sex and vaccination behaviours.

On account of the significant advantage of gain-framed information for prevention behaviours, Gallagher and Updegraff (2012) concluded that they 'found support for Rothman and Salovey's underlying prediction for the moderating role of prevention vs. detection function on health behaviour' (p. 113). Everything considered, however, interpreting these results as providing partial support for the risk-framing hypothesis seems to be setting the bar quite low. After all, the study provided no evidence for a loss-framed advantage in the domain of detection behaviour and found only limited support for a gain-framed advantage in the domain of prevention behaviour. As with the direct experimental evidence for the influence of behavioural function on the effects of framed messages, the meta-analytic evidence in favour of the risk-framing hypothesis can be described as weak and unconvincing (see also the meta-analysis by Tannenbaum et al. (2015)), which found that the effectiveness of fear appeals did not differ between prevention and detection behaviour).

One could argue that these results pose a major problem for the risk-framing hypothesis. However, several authors have noted that it may still be used to predict message-framing effects, even in the absence of convincing main effects of framing for prevention and detection behaviours. These authors argue that other factors besides behavioural function also influence people's perceptions of a behaviour as safe or risky and that the interaction between behavioural function and frame may not materialise when these other factors are predominant (Latimer et al., 2007; Schneider et al., 2001). For instance, even though smoking cessation clearly is a prevention behaviour, some people might perceive quitting smoking as entailing many costs and consequently may be more responsive to a loss-framed message than a gain-framed message (Schneider et al., 2001). In the following section, we therefore turn to the evidence for the influence of perceived risk.

What about perceived risk?

Recently, Van 't Riet et al. (2014) reviewed the available empirical evidence for an interaction between perceived risk and message framing. They noted that different studies have used different operationalisations of risk, making comparisons difficult. As detailed above, in the risk-framing hypothesis risk is conceptualised as recipients' perceptions of the potential downsides of the recommended behaviour. Indeed, several studies have investigated whether perceptions of the recommended behaviour's downsides moderate the effects of message framing (e.g., Cohen, 2010; Toll et al., 2008). Several other studies, however, have operationalised risk as the uncertainty surrounding the recommended behaviour's upsides (e.g., Bartels, Kelly, & Rothman, 2010), a practice that stays closer to prospect theory's original tenets. For both types of perceived risk, however, Van 't Riet et al. have noted that the evidence in favour of the risk-framing hypothesis is mixed. Whereas the results of some studies showed support for the risk-framing hypothesis (e.g., Bartels et al., 2010; Meyers Levy & Maheswaran, 2004), other studies found only partial support (e.g., Hwang, Cho, Sands, & Jeong, 2012; Toll et al., 2008), and yet other studies found no support (Cohen, 2010; Gallagher, Updegraff, Rothman, & Sims, 2011). In addition, Van 't Riet et al. presented the results of six studies, four of which tested the influence of perceptions of the potential downsides of the recommended behaviour and two of which tested the influence of the uncertainty surrounding the recommended behaviour's upsides. None of these six studies yielded support for the risk-framing hypothesis.

In yet another conceptualisation of the term 'risk', several researchers have operationalised risk as recipients' baseline perceptions of their chances of falling ill (i.e., recipients' perceived vulnerability before having received the framed information). This third conceptualisation at first glance seems to yield more promising results than the previous two (Van 't Riet et al., 2014), with several studies finding a significant effect in the hypothesised direction (e.g., Apanovitch, McCarthy, & Salovey, 2003; Gallagher et al., 2011; Gerend & Shepherd, 2007; Hwang et al., 2012; but for non-support, see Lalor & Hailey, 1989–1990; Millar & Millar, 2000). However, predicting an interaction between perceived vulnerability and message-framing strays even further from prospect theory's original tenets than the risk-framing hypothesis does. After all, the risk-framing hypothesis holds that the effect of framing is influenced by the risk that is associated with the recommended behaviour. But at least for prevention behaviours, a 'baseline' estimate of the risk of falling ill (a smoker's perception of his own risk of contracting lung cancer, for instance) has no direct bearing on the risk that is associated with the recommended behaviour. If anything, such risk perceptions say more about the option of non-compliance than about the option of compliance. After all, a smoker who considers himself to be at risk of lung cancer should perceive non-compliance, thus continuing to smoke, as particularly risky. If information about the positive consequences of the healthy behaviour makes people risk-averse, as the risk-framing hypothesis holds, then gain-framed information should be particularly likely to persuade this smoker to quit smoking. In spite of this logic, however, many researchers have hypothesised that a high baseline-perceived vulnerability makes loss-framed messages more persuasive than gain-framed messages (Apanovitch et al., 2003; Gallagher et al., 2011; Gerend & Shepherd, 2007; Hwang et al., 2012), incorrectly deriving this expectation from the risk-framing hypothesis. As such, a reliable interaction between baseline-perceived vulnerability and message framing cannot be considered evidence in favour of the risk-framing hypothesis. Instead, if such an interaction is found, we argue that alternative theorising should be employed to account for these findings.

In sum, while several studies find support for the moderating role of perceived vulnerability, an interaction between perceived vulnerability and message framing does not follow logically from the risk-framing hypothesis or indeed prospect theory. It can be concluded that across the first two operationalisations, those that are most in line with the risk-framing hypothesis, the evidence for the moderating role of risk is inconsistent. This conclusion was also reached by a recent systematic review (Covey, 2014).

The use of additional hypotheses

A careful investigation of the health message-framing literature suggests that the research community is sometimes more inclined to interpret specific results as partially in line with the risk-framing hypothesis than as mostly inconsistent with it. For instance, Rothman et al. (1993) findings have been generally taken to support their hypotheses, even though Study 1 failed to find framing effects for prevention behaviour, and only found differential effects of framed detection messages for women, not for men. Their Study 2 found that gain- and loss-framed prevention messages had no differential effects on 'requesting information and sunscreen', only on 'the percentage of Level 15 sunscreen requested' and again only in women. The failure to find an effect in men was explained by men's supposed low interest in preventing or detecting skin cancer: attentive and elaborate processing of the health-promoting messages was deemed necessary for framing effects to occur (see also Rothman et al., 1999). Another study, however, found that gain-framed antismoking messages were more persuasive than loss-framed messages, but this time only in people with a low NFC, who presumably processed the information only superficially (Steward, Schneider, Pizarro, & Salovey, 2003). Even though the results of these studies are clearly at odds with each other, both of them were taken to be in line with the risk-framing hypothesis.

Such reasoning seems to be quite common in the message-framing literature. Close inspection reveals a large number of studies that claim to provide support for the risk-framing hypothesis, but in fact were only able to find support among subgroups of the sample. One study found support

for the hypothesised interaction for some behavioural domains but not for others (Hwang et al., 2012). Two studies found the expected effect only for women (Rothman et al., 1993; Toll et al., 2008), while a third study found it only for men (Latimer-Cheung et al., 2012).

Sometimes clear non-support does not do the trick: when one study found an overall loss-framed advantage for vaccination behaviour, clearly and unequivocally a prevention behaviour, the authors did not overtly question the tenets of the risk-framing hypothesis, instead describing the results as ‘an important exception to the commonly observed gain-framed advantage for preventive health behaviours’ (Gerend, Shepherd, & Monday, 2008; p. 221). As our overview of the message-framing literature has shown, however, this confidence in the risk-framing hypothesis is not warranted.

Conclusion and a suggestion for the way forward

Our discussion of the basic tenets of the risk-framing hypothesis has shown that it has fundamental theoretical flaws, and a thorough investigation of the empirical evidence in favour of the risk-framing hypothesis has shown that it is weak. In our view, it would be better to interpret this failure to find comprehensive support for the risk-framing hypothesis as reflecting its weaknesses, not as ‘partial support’.

After discarding the risk-framing hypothesis, one cannot help but feel exasperated by how little we actually know about message-framing effects. It seems that all we have to offer to health-promotion practitioners is a plethora of potential message-framing moderators without an overarching theoretical framework. To make matters worse, some of these moderators seem to have unstable effects across studies. For example, one study found loss-framed messages to be more effective than gain-framed messages for recipients with high self-efficacy (Van 't Riet, Ruiter, Werrij, & de Vries, 2008), but another study found the opposite effect, with a gain-frame advantage for recipients high in self-efficacy (Werrij, Ruiter, Van 't Riet, & De Vries, 2011). Likewise, one study found loss-framed messages especially effective when recipients had been primed with the colour red (Gerend & Sias, 2009), but another study found the exact opposite pattern (Chien, 2011). For this reason, we suggest a new approach is necessary for message-framing research. At the close of this article, we therefore offer suggestions for such a new approach. As a comprehensive discussion of plausible hypotheses is beyond the scope of this article, we will not focus on theory, but on study design and methodology. We argue that in message-framing research, besides a need for new theory, there is an urgent need for new methodology.

Central to our argument is the notion that researcher should ‘think small’ and closely investigate all relevant psychological processes that occur when people are exposed to framed health messages. As one reviewer of the present article rightfully noted, the nature of the message-framing paradigm (gain- vs. loss-framed messages containing essentially equivalent information) is bound to result in small effects. If participants in all conditions receive the same information, it cannot be expected that there will be large differences in persuasive outcomes. Even small effects, however, may translate to substantial changes at the population level. In addition, small shifts in one variable can have important effects over time if they are self-reinforcing (cf. Slater, 2007) or if they influence other important variables (cf. Gerbner, Gross, Morgan, Signorielli, & Shanahan, 2002). Rather than discarding message framing as not consequential, it is therefore warranted to understand its effects, even as these are expected to be small. In fact, we argue that researchers should embrace this ‘smallness’. Only after we have achieved a better understanding of the small immediate effects of message framing can we hope to investigate how these effects can translate into behaviour at the population level over time.

Unfortunately, the research into these small effects is hampered by studies employing long health messages in which *a number of things* are going on that could potentially affect the way recipients process, understand or react to it. Therefore, we propose a message-framing research agenda where researchers focus on the details of framed messages and the subtle effects that these details can have.

For instance, recipients can be influenced by 'antecedent framing', but also by 'consequent framing'. To understand what we mean by this, consider the following sentence that is typical of messages used in message-framing research: 'If you quit smoking, your chance of lung cancer will decrease'. The sentence basically constitutes a conditional proposition with an antecedent ('if you quit smoking') and a consequent ('your chance of lung cancer will decrease'). Message framing is often understood as antecedent framing, where the loss-framed equivalent of the above-mentioned sentence would be: 'If you don't quit smoking, your chance of lung cancer will increase'. But O'Keefe and Jensen (2006) have already pointed out that, besides the antecedents, the choice of consequents can also affect the persuasive effects of health messages. Here, the consequents of the recipients' behaviour are cast in essentially negative terms, referring to his or her chance to get lung cancer. But they could just as well be cast in positive terms, as in: 'If you quit smoking, your chance of a healthy life will increase'. In fact, if we would contrast this latter sentence with our original one, we are in fact not engaging in antecedent framing, but in consequent framing, where the consequents of the decision are framed positively or negatively.

Research suggests that consequent framing matters. For instance, one study found that, when consequents were framed positively, positive antecedent framing (e.g., 'If you perform the healthy behaviour') was more effective than negative antecedent framing (e.g., 'If you don't perform the healthy behaviour'), while the reverse was true when consequents were framed negatively (Cesario, Grant, & Higgins, 2004). In general, however, the issue of antecedent and consequent framing is ignored in the message-framing literature. In fact, it is quite common to confound antecedent framing and consequent framing in message framing experiments. For example, one study employed a gain-framed message that was entitled 'Great Breath, Healthy Gums Only a Floss Away', while the loss-framed message was entitled 'Floss Now and Avoid Bad Breath and Gum Disease' (Mann, Sherman, & Updegraff, 2004). The gain-framed message included the phrase 'flossing your teeth daily [...] promotes great breath', while the equivalent phrase in the loss-framed message was 'if you don't floss your teeth daily [this] causes bad breath'. In this study, then, antecedent framing and consequent framing were clearly confounded. To increase our understanding of message-framing effects, we argue that antecedent framing and consequent framing should be manipulated and investigated independently from each other (e.g., Cesario et al., 2004).

But the challenge does not stop there. The use of negations is another issue that deserves attention in message-framing research. Consider again our gain- and loss-framed sentences on smoking cessation above and notice that the loss-framed sentence includes a negation ('if you don't'), whereas the gain-framed sentence does not. Research has shown that including negations in verbal material slows down information processing and makes it more error-prone (Clark & Chase, 1972; Deutsch, Kordts-Freudinger, Gawronski, & Strack, 2009). Thus, stressing the consequences of quitting smoking may be objectively equivalent to stressing the consequences of not quitting smoking, but the use of negations in the loss-framed message may cause the resulting psychological processes to be divergent. Unfortunately, message framing is confounded with the use of negations in most studies. For instance, the study referred to above included negations in the loss-framed message, but not in the gain-framed message.

Of course, researchers could choose to apply antecedent framing without the use of negations. The loss-framed sentence in our example would then be: 'If you continue to smoke, your chance of lung cancer will increase'. But it is far from clear that distinct phrases will be perceived in the same way. After all, it is known that asking people whether something should be 'allowed' can yield vastly different results from asking whether the same thing should 'not be forbidden'. It seems that these two constructs, while logically equivalent, carry different meanings for most people (Holleman, 2006). So who is to say that 'quitting smoking' and 'not continuing smoking' are perceived as equivalent in people's minds? And who is to say that '[not obtaining] great breath' is perceived as equivalent to 'avoiding bad breath'? In other words, in one single study (Mann et al., 2004), antecedent framing was confounded with consequent framing, the use of negations and distinct phrasing. Although not all message-framing publications provide the full texts of

the employed messages, we suspect that such confounds are extremely common in message-framing studies, profoundly complicating the enterprise of trying to understand what goes on in message-framing effects.

In sum, we suggest that subtle differences in a health-promoting message beside its frame may influence recipients' reactions to the message. Unfortunately, traditional message-framing research is poorly equipped to deal with this complexity. A single gain-framed message of perhaps 200 words contains a number of things that can have some effect on the recipients. In most studies, then, it is impossible to tease out which of these factors caused the effect. We argue that the way around this is to conduct particularly fine-grained analyses, employing controlled settings and responsive outcome measures. Perhaps most importantly, 'pure' manipulations are necessary, in which antecedent framing is not confounded with consequent framing, negations or other important factors. As an example, Brüll, Ruiter, and Jansma (2016) conducted a first EEG-study in which they investigated the effect of single sentences which were either gain- or loss-framed on event-related potentials (ERPs) known to be relevant for language processing. Their results showed that sentences with negations and, independently, loss-framed sentences elicited ERPs usually associated with processing difficulties, leading the authors to conclude that affirmed gain frames may lead to improved processing.

The leap from processing a single sentence to the decision to change one's behaviour is substantial. So we understand that research focusing on the small effects of subtle manipulations may not be very inspiring to those who want to conduct research that can lead to immediate improvements of health-promotion practice. But we argue that an in-depth analysis of message framing is more worthwhile than another large-scale field experiment using 200-word messages and behavioural outcome measures. In the long run, the more granular approach may provide a better path to understanding how message framing can influence recipients in subtle but consistent ways. When this is the case, follow-up studies can investigate how these subtle effects influence actual health behaviour.

Regardless of one's opinion of these suggestions, which space will not allow us to elaborate on further, the present article clearly shows that there is no convincing support, either theoretical or empirical, for the risk-framing hypothesis. While the risk-framing hypothesis has been central to message-framing research for the past 15 years and can be considered established doctrine in the health message-framing field, the present article shows it is time that researchers turn their attention to other hypotheses in the field of message framing.

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